Barriers and facilitators to using digital technologies in the Cooperative Learning model in physical education

Bodsworth, Hannah; Goodyear, Victoria

DOI:
10.1080/17408989.2017.1294672

Barriers and facilitators to using digital technologies in the Cooperative Learning model in physical education

Hannah Bodsworth[a] and Victoria A Goodyear[b1]

[a]Bedford Modern School, UK. Email: hbodsworth@bedmod.co.uk

[b]School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, UK. Email: v.a.goodyear@bham.ac.uk

Abstract

[1] Corresponding Author; Victoria A Goodyear, University of Birmingham, Edgbaston, UK. B15 2TT. Email: v.a.goodyear@bham.ac.uk

Background: The influence of technology on children's everyday lives is significant in today's society, with children described as digital natives and/or the iGeneration. There are also a range of digital technologies available for use in education and a number of pedagogical approaches reported to support technology integration and pupil learning in physical education contexts. The use of technology by practitioners at present, however, is far from omnipresent. Consequently, the mechanisms that can support practitioners to use digital technologies to help pupils learn optimally in physical education requires further attention.
Purpose: The purpose of this study was to explore the barriers and facilitators to purposeful technology integration when using the Cooperative Learning model in physical education.
Research Design: Data are presented from an action research project that focussed on how a teacher-researcher used iPads (tablet personal computers) within the Cooperative Learning model to support pupil learning. An athletics (track and field) unit was taught to two separate classes (37 pupils in total) using the key features of the Cooperative Learning model. The teacher-researcher used action research as a professional learning mechanism to refine her practice through gathering data from focus groups interviews with pupils, teacher-researcher reflections and a colleague's observations.
Data Analysis: Data analysis was ongoing throughout the athletics units as part of the action research design. Following the unit data were analysed through inductive analysis and constant comparison and the authors engaged in a peer examination process.
Findings: Unfamiliarity with technology and poor group cooperation were identified as initial barriers to pupil learning when integrating technology. Action research, however, and the process of reflection and collaborative inquiry acted as key facilitators for the teacher-researcher to learn how to use digital technology to support learning.
Conclusion: Findings challenge existing literature which position the 'digital natives' or iGeneration of today's society as competent and able to use digital technologies to learn in formal educational contexts. Moreover, this study shows that selecting a well-defined pedagogical approach that has been previously reported to support technology use, such as Cooperative Learning, will not automatically result in positive learning experiences for pupils. If practitioners are to purposefully integrate digital technologies into physical education and ensure technology can help students to learn optimally, practitioners should engage with a reflexive process of learning, such as action research, to refine and develop their practices.

Key words: pedagogy; technology; iPads; Cooperative Learning

Introduction

The influence of technology on children's everyday lives is significant in today's society, with children described as digital natives (Prensky 2012) and/or the iGeneration (Fullan 2013; Rosen 2010). Both terms refer to the generation of children who were "born surrounded by technology" (Rosen 2010, 3) and are assumed to be competent in using technology (Prensky 2012). While there is a level of critical debate around whether generational assumptions can be made (see Fullan 2013; Gardner and Davis 2014), Kretschmann (2015) argued that technology is ubiquitous in children's everyday lives. This view is furthered by the UK Office of Communications (2014, 20) who found over three quarters of children stated that they would "not know what to do without it [technology]'. Yet, as Rosen highlighted (2010, 14), "today's youth thrive on multimedia, multitasking, social environments for every aspect of their lives, except education". Indeed, within education, technology is far from omnipresent (Fullan 2013), for reasons including expense (Orlando 2014), teacher competence (Law, Pelgrum and Plomp 2008) and practicality (Palao, Hastie, Cruz and Ortega 2013). In turn, many agree that there is an urgent need to further consider how technology can be used in schools and classrooms to support young people's learning (International Society for Technology in Education 2008; Juniu 2011; Pyle and Esslinger 2014).

The purpose of this paper is to explore the facilitators and barriers to purposeful technology integration when using the Cooperative Learning model in physical education. Data is presented from an action research project that focusses on how a teacher-researcher used iPads (tablet personal computers) combined with Cooperative Learning to support pupil learning. The research question is as follows:

> What are the facilitators and barriers to using digital technology to support pupil learning in physical education?

Although small research projects alone cannot seek to address the existing knowledge gap on effective technology integration (Fullan 2013; Selwyn 2014), they can be used to scaffold future research. Action research can also be used to provide systematic insights into the journey of teacher change and the personal, social and contextual factors that influence teachers' practices (Casey 2013; Cook 2009). Casey (2013) argued that reporting on the process of change, rather than solely the impact of an intervention, is a necessary component of understanding pedagogy. Indeed, teacher learning and the adoption of new teaching methods or tools is not a smooth or one-directional process (Cook 2009; Fullan 2013). The discovery of challenges and resistance, alongside success, is critical to inform future practice (Casey 2013; Cook 2009). This paper, therefore, aims to contribute to contemporary and international research by providing guidelines on technology use that emerge from a detailed account of the process of, and the outcomes of, a practitioner's attempts to use technology to help students to learn optimally.

Technology in education and physical education

Focusing on technology in physical education is particularly important given the discipline specific technologies (Enright *et al.* 2016). For example, sport specific, video-analysis and health-related software and applications ('apps'), cameras, active video games, and wearable devices that can record and track movements are available (Casey, Goodyear and Armour 2017; McCaughtry, Oliver, Dillon and Martin 2008). In addition, digital technologies have been reported to increase pupil motivation (Pyle and Esslinger 2014) and engagement (Goodyear, Casey and Kirk 2014), enhance pupils' cognitive understanding (Palao *et al.*, 2013; Casey and Jones 2011), support assessment (Penney, Jones, Newhouse, and Cambell 2012) and assist in learning and performing motor skills (O'Loughlin, Chroinin and O'Grady 2013; Palao *et al.* 2013) and dance movements (Öhman, Almqvist, Meckbach, and Quennerstedt 2014). Yet while these benefits exist there are numerous barriers to

teachers' uses of technology, including time (Palao *et al.* 2013), expense (Orlando 2014), teacher-burden (Pyle and Esslinger 2014), teacher competence (Law, Pelgrum and Plomp 2008), practicality and mobility of devices (Palao *et al.* 2013) and a level of teacher resistance to change and use technology (Kretschmann 2015). In addition technology is predominantly used as an 'add-on' to lessons (Palao *et al.*, 2013) or as a 'tick boxing' exercise, with the decision to use technology based on meeting school and governmental expectations (Enright *et al.* 2016; Hastie, Casey and Tarter 2010). Consequently, while there is scope for technology to facilitate learning, school-based restrictions and teachers' willingness to use technology are resisting factors, where the any uses of technology are often not foregrounded in the potential for technology to support pupil learning.

Developments in 'mobile' (i.e. portable) devices and the growing use and accessibility of tablet computers has been suggested to provide new opportunities for teachers and pupils to use technology in physical education (Armour *et al.* 2016; Chambers *et al.* 2016). An example of such a mobile technology is the iPad. As Apple (the producers and business enterprise of the iPad) suggest, the iPad is 'a device like no other' which 'changes the way you do things and what you think is possible'[2]. Tablets, like the iPad are personal computers that use touch sensitive screens to allow the user to interact with digital and web-based content (Chambers *et al.*, 2016). The mobility of the iPad is seen as one key advantage for the practical environments of physical education (Chambers *et al.* 2016). The widespread use of mobile technologies, such as the iPad, in non-educational activities (Armour *et al.* 2016; Selwyn and Stirling 2016) is also an important consideration. Familiarity with similar and other mobile technologies could be leveraged to support teachers' and pupils' confidence, competence and willingness to use such technologies in the classroom (Fullan 2013; Rosen 2010).

[2] https://www.apple.com/education/ipad/apps-books-and-more/

The apps available on iPads also provide new opportunities for physical education (Armour *et al.* 2016; Casey *et al.* 2017). Video-recording, for example, has been identified as an effective use of technology to support learning (Armour *et al.* 2016; Casey and Jones 2011; Chambers *et al.* 2016). The iPad encompasses apps for video-recording in a user-friendly way with features such as freeze-frame and slow-motion (see Enright *et al.* 2016). Moreover, the instant playback feature is considered to enhance video-analysis capabilities and strengthen pupils' ability to engage in peer and self-assessment tasks (Armour *et al.* 2016; Chambers *et al.* 2016; Enright *et al.* 2016). It seems reasonable to argue, therefore, that mobile digital technologies, like the iPad, could support pupil learning, while overcoming some of the barriers to technology integration. Yet, and as Fullan and Donnelly (2013) have argued, the functionality of digital technologies alone cannot strengthen pupil learning. Indeed, the pedagogical process of integrating technology needs to be carefully considered (Casey *et al.* 2017).

Research in physical education is allowing us to begin understanding the relationship between pedagogy and technology (Casey *et al.* 2017). For example, the pedagogical model Cooperative Learning has been reported to support the integration of technology (Goodyear *et al.*, 2014; Johnson and Johnson 2014). Combining Cooperative Learning with technology seems effective because of the model's "sympathetic fit with contemporary educational discourse" (Dyson and Casey 2012, xv). The 'fit' of Cooperative Learning with technology is attributed to the pupil-centred focus of the model which is reflexive and promotes learning through providing teachers with a pedagogical scaffold for organising group work activities (Goodyear *et al.*, 2014; Fernandez-Rio, Sanz, Fernandez-Cando and Santos 2016). Indeed, pupils have a mutual reliance on each other to achieve learning outcomes (Fernandez-Rio *et al.* 2016), where technology can be used as a tool to facilitate peer-learning through pupils being dependent on one another, accountable to each other and required to engage in

promotive interactions and reflective discussions about their learning (Goodyear *et al.*, 2014; Johnson and Johnson 2014). While not directly related to Cooperative Learning, Prensky (2012, 25) advocated peer teaching and cooperation as an "enormous free resource dramatically aided by technology". This argument by Prensky (2012), furthers the potential of Cooperative Learning to support pupil learning using digital technologies.

Fernandez-Balboa (2003, 143) argued over a decade ago that "the possibilities are endless; what is needed is imagination". It therefore seems vital that the pedagogical integration of digital technologies is further considered. A pupil-centred approach, such as Cooperative Learning, combined with mobile technologies, such as the iPad, seems one way forwards. However, Fullan (2013) advocated that we need to not only understand the relationship between technology and pedagogy, but we also need to consider change knowledge. In other words, what is needed is a better understanding of the mechanisms that support teachers to integrate digital technologies effectively into the pedagogical context. This paper aims to provide new insights into how teachers can change and develop their practices to support technology integration.

A note on authorship

Similar to Goodyear et al. (2014), the study was a participant action research project, and therefore has been written from two perspectives. The first perspective 'I' takes account of the teacher-researcher role and describes the first-hand experiences of the school-based research, with support from the co-author. The second perspective 'we', is used when discussing findings in relation to wider research.

Methods

Participants and setting

The setting was a UK co-educational independent day school located in South East England. Most pupils are from professional and business families and are of white British origin, with some pupils from minority ethnic backgrounds.

36 pupils aged 11-12 and the teacher-researcher were involved. Pupils were from two mixed-gender and mixed-ability classes, consisting of 17 (5 girls and 12 boys) and 19 pupils (6 girls and 13 boys) respectively. Pupils had been in this class for the duration of the academic year. The curriculum was organised around a multi-activity model where various sports/games and activities were taught in units of six to ten weeks, consisting of 55 minute lessons. The curriculum prioritised the learning of sport-specific skills mainly through reciprocal and practice learning styles, with elements of more student-centred learning in creative activities such as, gymnastics. Pupils experienced one (55 minute) physical education lesson and one (110 minute) games lesson per week. Physical education lessons were mixed gender and mixed ability, whereas games lessons were ability set and separated by gender. During games lessons in the summer term of this study, the boys took part in cricket and the girls Tennis or Rounders. During physical education lessons the focus was on athletics (track and field).

At the time of this study I was completing my first year of teaching as a qualified teacher. I used a range of peer- and group-based learning strategies, and pupils within the classes of this study had experience of these. I had also acquired a basic user knowledge and familiarity with a personal iPad over a three-year period and felt competent in using basic camera functions and video-playback features. Prior to this study, I had familiarised myself with video analysis apps (for example, Dartfish) and had experimented with using an iPad and apps within some of my lessons, but I had not attended any specific courses on using technology. The school had recently purchased iPads for my physical education department, however, neither myself of the pupils had used these iPads within physical education lessons.

This action research project focused on students and my own initial uses of these newly acquired iPads.

Cooperative Learning was selected a pedagogical focus for the unit following discussions with the second author. During my post graduate teaching degree, I had acquired the foundational knowledge of how to structure Cooperative Learning lessons and units, from both practical and theoretical sessions. However, I had not taught a unit using Cooperative Learning. By consequence, although the pupils in this study had experience of peer and group-based learning strategies, the pupils were also new to Cooperative Learning.

Prior to data collection, university ethical approval was granted and all participants granted consent. Pseudonyms are used in the reporting of the findings.

The units: Cooperative Learning and the iPads

An eight lesson (55 minute lessons each) Cooperative Learning unit of athletics was taught to both classes. The Cooperative Learning unit was the focus of the pupils' physical education lessons each week. The games unit, that ran simultaneously, was taught by another teacher and the Cooperative Learning model was not used.

For the Cooperative Learning unit, pupils were organised into small heterogeneous groups and each group was provided with an iPad. Each unit began with a lesson zero; a lesson dedicated to familiarising pupils with their learning groups and learning routines (Dyson and Casey 2016). This lesson zero also focussed on supporting pupils' understanding of how to use the iPads, which Hu and Garimella (2014) state is important for familiarisation and for pupils to gain an initial understanding of basic functions. Following the lesson zero, subsequent lessons focussed on an athletic pursuit; two lessons for long jump and sprinting, with javelin, high jump, shot putt and discus each being covered within a single lesson.

When introducing the iPads in the lesson zero, pupils were shown how to access the camera, including the record button, the playback function and the slow motion feature. This information was delivered to pupils through teacher-led instruction. Pupils were then asked to

film their partner performing a task; a sprint start or a shot putt throw with a tennis ball. The task focused on pupils discovering the best ways to use the iPad, for example, identifying and justifying the best angle for filming, considering sunlight and the safety of the recorder, alongside identifying when to press record on a sprint-start and experimenting with the slow-motion feature. During this phase of the lesson zero, minimal teacher-input was given. Pupils were then given an opportunity to discuss and alter their uses of the iPad within their learning groups, before discussing as a whole class the considerations needed when using the iPads.

During the first few lessons of the units one or two pupils per group were given instructions on how to use the iPads. These instructions detailed how to record their peers' performing a sprint start, how to playback the video and how to refer to the coaching points given on the teaching resource in order to analyse performance and provide peer feedback. It was expected that pupils would use their knowledge from the lesson zero to use the basic camera functions. Later in the units, and during lessons where more advanced apps were used, such as Dartfish, pupils were given teacher-led instructions and a demonstration within their individual groups. I also monitored groups as they used the app and I provided technical input if none of the members of a group knew the answer.

In an attempt to maintain a level of model fidelity (see Casey, Goodyear and Dyson 2015 for further detail), my use of Cooperative Learning was guided by the key features (see Table 1) (Goodyear 2016). These key features included the Cooperative Learning elements (positive interdependence, individual accountability, promotive face-to-face interaction, and group processing) and the additional procedures (mixed groups, group goal, teacher-as-facilitator, and learning structure) to offer a pedagogical scaffold for organising group work (Dyson and Casey 2016). The Cooperative Learning structure of learning teams (see Dyson and Casey 2016), was selected to be used for the duration of the unit and pupils participated in different roles each lesson that included, an equipment manager, group discussion

manager/recorder, warm up manager and coach. The use of a Cooperative Learning structure further supports and ensures key features of Cooperative Learning are applied, thus supporting model fidelity (Dyson and Casey 2016). To further support model fidelity, each lesson was planned and reviewed with the second author, a more experienced researcher of Cooperative Learning who had also taught physical education using this model. It should also be noted that I retained a focus on the key features through my use of a structured reflection tool, the Post-Lesson Teacher Analysis Tool (PLTA) (further detail provided in data gathering section). As a result, while there was not a specific validation strategy, the use of a Cooperative Learning structure, collaborative planning, and structured reflections supported a degree of model fidelity.

<insert Table 1 here>

The iPads were used as a tool to promote pupil interaction through peer and self-assessment. For example, the iPads were used by pupils to (i) video record group members performing the long jump, (ii) watch professionals or older pupils in the school performing the skill, (iii) to compare two performers and (iv) to support pupils' reflections on their learning and group work during group processing. This was achieved through using the camera app and the Dartfish app. The camera app allowed for video recording and replaying the videos with freeze-frames or in slow-motion. Dartfish is a video-analysis app which imports videos taken from the camera and uses tools such as frame-by-frame slow motion, measurement and drawing tools and split-screen. This app enables users to compare videos of different performances.

Action Research

Action research can be characterised as a process whereby teachers use research to reflect on their practice and the situational context to systematically understand and improve the situation in which they are practicing (Ax, Ponte, and Brouwer 2008; Kemmis and

McTaggart 1998). The process is often cyclical in nature where teachers can plan, act, observe and reflect on practice (Figure 1) (Kemmis and McTaggart, 1998). Within this cyclical process Ax et al. (2008) identified that teachers can gain new insights into how they practicing through, (i) analysis of practice and data, (ii) dialogue with others, and (iii) negotiation with pupils.

The cyclical process and Ax et al.'s (2008) framework of dialogue, negotiation and analysis informed how I applied action research. Every two lessons, I engaged with a mini cycle (Ax *et al.,* 2008) and sought to understand and improve my practice based on the challenges and opportunities identified in teacher-researcher reflections (analysis), discussions with the second author and colleagues in my department (dialogue), and from pupil opinion gathered from focus group interviews (negotiation). To inform the planning in the next mini cycle (where there were 3 further across the units), I read over my reflections (from the PLTA and the 5 minute reflection), discussed the emerging findings with colleagues and the second author, and used these understandings to inform the focus group interviews to identify required changes. At the end of the unit I sought to analyse the overarching main cycle (i.e. the units), with the aim of looking forward to my future practice (Ax *et al.,* 2008).

As will be shown in the following sub-sections, several data gathering sources were used to, (i) inform my practice and (ii) inform the data used to report on the research question of this study. It should be noted that while I engaged with dialogue with my colleagues and the second author, these were not recorded or used as a data source. One colleague observation of a lesson, as part of the school\s processes for supporting newly qualified teachers was used as data gathering source to provide contextual insights.

Before the data gathering tools are discussed due to my teacher-researcher role I was highly engaged in the study as an insider. This raises concerns related to validity, as the

closeness of the teacher-researcher to the pupils may have prevented some of the pupils from expressing their opinions openly and honestly (Dwyer and Buckle 2009). However, triangulation of data through several data-gathering sources shows how credibility was maintained. Moreover, as the aim of this action research project was to find solutions to the research question based on the views and interpretations of those involved in the research, I did not promote definitive right or wrong answers to the pupils. Finally, my insider role status had the potential to allow in-depth data to be gathered. Indeed, Dwyer and Buckle (2009) argue that a greater depth of data can be collected by having an insider role due to the shared identify and a higher level of trust between the researcher and participants. Therefore, it is recognised the teacher-researcher was a weakness and a strength of this study.

<insert Figure 1 here>

Modified version of Post-Lesson-Teacher-Analysis (PLTA)

As a key component of analysis of practice, at the end of each lesson a PLTA was completed. Using a modified version from Dyson (1994), the questions were designed to prompt reflection on the key features of Cooperative Learning, the uses of technology and pupil learning (see Table 2). This tool was, therefore, focused on my pedagogy and sought to guide my understanding of how students were responding to the iPads and Cooperative Learning.

<insert Table 2 here>

5 Minute Reflection

A second component of analysis of practice was an adapted version of the five-minute reflection (Fairbairn and Fairbairn, 2004). This 5 minute reflection was completed immediately after each lesson. Writing for five minutes has been used previously to help novice writers gain experience in writing through allowing an un-structured format (Fairbairn and Fairbairn 2004). Similar to Casey (2010), however, I used writing for five minutes as an unstructured form of reflection to allow me to reflect on most prominent thoughts about each

lesson. In contrast to the PLTA, the five-minute reflection was not guided by a specific focus on teaching, changes to my practice, the technology or Cooperative Learning. Instead, the 5 minute reflection captured my personal, social and contextual features to my practice, and as will be shown in the results section, it served as a tool for me to voice and then identity the challenges that I faced in changing my practice.

Focus Groups Interviews

Focus group interviews were used as a component of negotiation. The interviews were conducted with each class after every two lessons and on completion of the Athletics unit, totalling four interviews for each class. Groups were purposefully selected to ensure each learning team was represented. The focus group interviews were semi-structured and were conducted by the teacher-researcher. Each focus group session discussed teaching and learning. For example, 'What did you enjoy most about the last two lessons?' and 'How would you like to use the iPads in future lessons to help your learning?' Additional questions were added to gain a deeper insight based on emerging findings arising from the processes of analysis and dialogue. For example, 'Explain if you felt the balance between using the iPads and performing the practical skill was right in the discus lesson.' In considering the management of teacher-pupil power dynamics, I was aware pupils needed to take the lead in the focus group discussions and too much teacher involvement may influence their answers to what they perceived I wanted to hear. Therefore, and in an effort to address trustworthiness, I read the questions to the group and only occasionally asked prompting questions, allowing pupils to expand on peer answers.

Colleague Observation

As part of the dialogue process a colleague conducted a lesson observation during a 55 minute Javelin lesson (lesson five of eight in the athletics unit). The observer completed a Newly Qualified Teacher evaluation sheet, with the agreed focus for the observation being 'use of technology for learning'. *Ad-hoc* observations were used successfully in Casey and

Jones's (2011) research and formed part of my methodology due to the importance of considering colleagues' opinions, owing to their vested interest in the results.

Analysis

As part of the action research process data analysis was on-going throughout the unit and within mini cycles that occurred every two weeks. The central aim of each mini cycle was to identify key incidences and common suggestions for changes to my practice using insights generated from dialogue, analysis and negotiation.

Following the unit, data were analysed with the aim of answering the research question and to report on the findings of this action research study. Initially, I reviewed the data and then organised it into different constructs and sub-constructs, which allowed me to identify common codes through coding of the transcripts. This is recognised by Lincoln and Guba (1985) as inductive analysis. Throughout the inductive analysis I referred to my research question to allow me to identify the data which were most relevant to facilitators and barriers to technology integration. Codes included; group work, password restrictions, time and competence using technology. Following this, I collated all constructs and sub-constructs and began to group them into common categories. I identified codes that related to each other and wrote narratives to describe the data and group similar events. Lincoln and Guba (1985) refer to this stage as constant comparison.

A relativist approach was applied to guide validity (Burke 2016). A relativist approach extends the robustness of traditional measures of quality and validity (Burke 2016; Smith and Caddick, 2012), such as trustworthiness (Lincoln and Guba 1985). According Smith et al. (2015), a relativist approach means that universal criteria for judging the quality of research are not applied, but rather criteria are drawn from an on-going list of characterizing traits that relate to the context of the research. In this study, the list included the following criteria: the worthiness of the topic; the significant contribution of the work;

width, that is, the comprehensiveness of evidence and the use of multiple and numerous quotations from varying sources; credibility, through, the time the teacher-researcher spent with participants, alongside member-checking completed by the second author to open up dialogue about the fairness, appropriateness and believability of the interpretations offered; and transparency, that occurred through the on-going dialogue with colleagues and the second author within the action research design. As part of a list of characterising traits for enhancing the quality of this work, this study also aimed for coherence. In other words, how well the study hangs together in terms of purpose, methods, and results (Burke 2016; Smith and Caddick 2012).

Results

The first theme, 'unfamiliarity with technology and Cooperative Learning', shows that lessons were initially focussed on the organizational aspects of group work and/or the iPads. The second theme, 'learning how to support learning using the iPads', identifies how teacher reflections and pupil feedback were pivotal for the teacher-researcher to learn how to adapt when and how the iPads were used to support learning. Before these themes are discussed, it should be noted that while Cooperative Learning and the iPads were both 'new' to teachers and students, the findings strongly suggested that engagement with learning and group work, and the achievement of learning outcomes were strongly associated with the iPads. Although the aim of this section is not to exclude the novel influence of Cooperative Learning on teaching and learning, the focus remains on the dominant message emerging from the data, the influence of the iPads.

Unfamiliarity with technology and Cooperative Learning

Cooperative Learning emphasises that social and academic (physical and cognitive) learning should be considered on par with one another (Casey, Dyson and Campbell 2009). Similar to Dyson, Lineham and Hastie (2010), however, as students were initially introduced to

Cooperative Learning pupil engagement with social learning tasks was more prominent. A potential explanation for this was that pupils were challenged with organising their learning and working together to learn. 'Yale' explained, 'we have kind of been squabbling over who does what and perhaps wasting more time and not doing sport' (Focus Group 1, 15/5/15). Moreover, I noted that 'some pupils did not bond well at first and looked reluctant to work together' and that pupils were 'not always on task as they had freedom' (PLTA, zero lesson, 22/4/15). As a result, pupils spent more time discussing group work and less time engaging in physical tasks; 'feedback slot took away a lot of practical time – only threw [the javelin] three times each' (PLTA, lesson 5, 15/6/15). My colleague also observed this, stating that 'more throws per pupil were needed' (Observation feedback, lesson 5, 15/6/15).

While pupils being challenged with the introduction of a new pedagogical approach is not a new finding (see Casey *et al.* 2009; Dyson and Casey 2016), how the iPads brought a heightened level of complexity to the learning environment is significant. The iPads encouraged pupils to go off task and provided more reasons for pupils to 'squabble' with each other about organisational aspects of group work. 'Robert' claimed that 'some people are silly with them [iPads]' and 'Chris' remarked, 'some people with iPads just go crazy and they're all videoing everything' (Focus Group 1, 18/5/15). When looking at the data on the iPads I also found that pupils took selfies[3] rather than videoing their performances; 'still had to delete photos of people who were taking selfies!' (5 minute reflection, W3, 20/5/15).

It became apparent that the pupils did not know how to use the iPads to engage with learning tasks. Despite pupils' awareness of how to take a selfie, using the camera function to video others' performance was difficult; 'I found the camera buttons and stuff really challenging because you couldn't remember what buttons to press and then to watch the

[3] A selfie is defined as a photograph that one has taken of oneself, typically one taken with a smartphone or tablet (Oxford Dictionary, 2015b). This is identified as a prominent practice for youth Selwyn and Stirling (2016).

videos that you've done, [it] was quite hard to get back onto the videos' ('Eleanor' Focus Group 1, 18/5/15). In some groups, videos of performance were not captured and this increased tensions between group members. For example, one pupil did not film Ethan's first throw as he claimed he had 'technical difficulty' with the iPad which caused a slight disagreement in the group; ''Ryan' only had one video of 'Ethan' and added to it with verbal feedback which Ethan was not happy about' (5 minute reflection, week 6, 8/7/15).

The functionality of the iPads within the school-based technological restrictions was also a distraction. Each iPad was password protected and this resulted in pupils barely using them to support their engagement with learning tasks. Moreover, it seemed that the pupils were not working together as a group to use the iPads, with some pupils not engaging with the tasks of the lessons.

> We didn't really have a huge amount of time to use it [the iPad] especially with the faff of everyone having to get logged onto the iPads with all that it took quite a while.
> ('Ivan', Focus Group 3, 26/6/15)

> Not sure pupils learnt much from Dartfish as they did not have long on it…Only one group member was actively using the iPad whilst using Dartfish app – even though group members were sharing suggestions they sometimes looked like were spectators to learning. Some found it difficult to use… [and] pupils had to keep tapping the screen to ensure password protect did not come on.
> (PLTA, lesson 3, 26/6/15)

Due to the technological restrictions and the lack of awareness of how to use the iPads, some pupils began to dislike the use of iPads in lessons. Time spent on the iPad was perceived as a distraction from learning; 'I didn't like using them [the iPads] because it was wasting time that you could have had to improve yourself and had more jumps' (Harriett, Focus Group 2, 15/6/15). Equally, 'Aiden' felt the lessons with the iPads were no longer purely physical education: 'well in the previous lessons we didn't have iPads so now we have

them it's slowing our time down we don't have much time to do physical education, rather we're just kind of doing ICT[4]' (Focus Group 1, 18/5/14).

This section has shown how lessons became focussed on organisation of group work and/or the technology. The following section shows how my reflections and feedback from my pupils aided me to develop my practice and improve the learning context.

Learning to support learning through the iPads

Challenges to my practice quite clearly existed in pupils' ability to work in groups to learn and use the iPads to engage with learning tasks. Consequently, I began to adapt how and when the iPads were used within group work tasks. My lesson-by-lesson reflections and the focus group interviews with pupils were central to this process. As Table 2 shows, I identified solutions of how to better support learning, adapted how and when the iPads were used and then evaluated the impact these adaptations on my pupils' engagement with learning tasks. This section will explore this process of learning how to support pupils' learning using the iPads.

<insert Table 2 here>

Although I aimed to support pupils in performing and analysing their athletic skills using the camera and Dartfish app, it seemed they needed more specific and visual guidance on how engage with peer analysis. I initially identified this in my reflections, noting that a change to support pupil learning would involve creating additional paper-based resources of the key teaching points of skills; 'changes for next lesson will be to create resources which details teaching points alongside a picture, breaking down the different phases for the long jump' (PLTA, lesson 2, 13/5/15). The pupils suggested that the use of additional paper based resources supported their learning. In particular, they valued the pictures of the skills they were performing; 'It was helpful that there was a picture with each stage of the sheet, the

[4] ICT [Information Communication Technology] is a term often used to refer to technology

words, the description helps but the picture is more important' (Ivan, Focus Group 2, 12//6/15). As lessons progressed, pupils wanted to see more visual examples of the skills that they were expected to perform and analyse. Instead of paper resources, however, pupils suggested using the iPads to provide them with video-based examples of 'expert performances' and pupils suggested that . specific times needed to be dedicated to when they would use the iPads.

> 'Larry': There might be an app where you can see… like a famous person or something do a jump and then we can compare us to them.
> Teacher-researcher: So a video of the activity you're doing?
> Larry: nods head [suggesting yes] (Focus Group 2, 12/6/15)

> If we start the lesson looking at the technique of professionals as our groups and then when we go and do our jumps, then record one and compare it and then improve (Aiden, Focus Group 3, 29/6/15).

> I think you should film your first jump and then film your last jump when you've improved so you can see what the difference is and how you've got better. ('Harriett', Focus Group 3, 26/6/15).

Guided by my pupils' suggestions, I incorporated YouTube Videos into lessons and allocated specific time slots for when to use the iPads. Pupils seemed to suggest that these changes improved their ability to perform the skills because of the video analysis furthered their understandings of how to perform.

> 'Judy': I did find them helpful because you could kinda see what sorta technique you had to do and it was like easier to understand if you saw someone actually throwing it (Focus Group 3, 26/6/15).

> Harriett: Umm for our first jump we filmed it and then for our last improved jump I think we filmed it so we could see how we improved. That helped me to learn (Focus Group 4, 7/7/15).

Learning was beginning to be positively impacted because academic and social learning time became more balanced. Where previously lessons were focussed on how to organise group work and the iPads, through the changes of when and how the iPads were used pupils had more time to perform the skills and engage in feedback tasks.

> [I] used iPads for watching a video of a professional – purposeful at the beginning of lesson and not use again – lots of time for practical – all had 7/8 throws each. Still got feedback from partner (PLTA, lesson 6, 22/6/15).

> I think it was just right [timing] because we actually got most of the time to do the sport where in past cases we've been faffing about with certain apps (Harriett, Focus Group 3, 26/6/15).

The data shows (see Table 2) how a systematic process of listening to and attending to their learning needs was a significant professional learning mechanism for me to learn how to integrate the iPads into lessons. The action research process enabled me to use the iPads with enhanced pedagogical purpose and select learning tasks which required the specific use of the iPads in order to learn; in comparison to trying to fit the task around using the iPad. The pupil feedback gave pedagogical reasoning for the iPad use, which consequently aided the decision making process. Increased time for pupils to engage with both academic and social learning tasks, however, was not only related to the changes I made to how and when the iPads were used. Similar to Dyson *et al.* (2010), pupils increasing familiarity with the routine for learning through Cooperative Learning supported their ability to organise and manage their learning. Subsequently, the pupils commented on how they valued the independence they were afforded from the teacher.

> We're more familiar with the routine of where we go once we've changed and who does what when we are walking down so it takes up less time… (Ivan, Focus group 2, 12/6/15).

> I like working in a small group because it made us like more independent in our learning and it was a bit more fun that just somebody telling you what to do you have to work it out for yourself (Yale, Focus Group 2, 15/6/15).

Challenges within my lessons, however, still existed. For the pupils they struggled with 'trusting' their peers to provide feedback and I needed to question and re-assure pupils that peers could support their learning.

> Marcus: I'm not sure I can quite trust other members of my group to quite get the correct teaching points.
> Teacher-researcher: When we went through them as a group were they similar to what your group members had said?

> Marcus: Ermm they were quite similar but I think I did prefer going through it as a group so we definitely knew that that was the correct thing. (Focus Group 3, 29/6/15).

Moving beyond the school technological restrictions was a significant challenge to my daily practices. The reflection below shows that I had to spend a significant amount of time preparing the equipment for lessons and ensuring I had access to all of the iPads.

> Setting up beforehand with all the equipment was good but took a lot of teacher preparation. Lots of running around…literally running to make it on-time and get all iPads! (PLTA, lesson 5, 15/6/15).

In summary, my teacher reflections and focus group interviews acted as a key driver for me to learn how to adapt how and when the iPads were used. Changing the ways in which pupils could organise and manage their learning coupled with pupils' increased familiarity with working in groups through Cooperative Learning supported pupils' ability to engage with both academic and social learning tasks.

Discussion

The purpose of this research was to discover the facilitators and barriers to purposefully using digital technology to support pupil learning within the Cooperative Learning model. Unfamiliarity with technology and poor group cooperation were identified as initial barriers. Action research and the process of reflection and collaborative inquiry acted as a key facilitator for the teacher-researcher to learn how to use technology to support learning. The wider implications of this research will now be discussed.

Evidence has previously reported that time (Palao *et al.* 2013), expense (Orlando 2014), teacher-burden (Pyle and Esslinger 2014), teacher competence (Law, Pelgrum and Plomp 2008), practicality and mobility of devices (Palao *et al.* 2013) and a level of teacher resistance to change (Kretschmann 2015) are barriers to technology integration. In this study, and despite the mobility of the iPad seen as a facilitating factor (Armour *et al.* 2016; Chambers *et al.* 2016), different barriers were reported. The barriers identified were; (i) pupils' expectations for learning, (ii) unfamiliarity with how to use technology for learning,

(iii) school technological restrictions, and (iv) the introduction of a new pedagogical approach. This paper, therefore, adds to understandings of the barriers to technology integration in physical education.

Unfamiliarity with Cooperative Learning and school restrictions on technology use are rather obvious barriers, given the extensive evidence base that reports it takes time for pupils to learn how to learn in a new way (see Casey and Goodyear 2015; Dyson and Casey 2012; Potrac, Jones and Cushion 2007) and that schools are often not prepared to effectively support technology use (Fullan 2013; Selwyn 2014). Added to this, the teacher's unfamiliarity with Cooperative Learning and using digital technologies should also be acknowledged as barriers. This study was the first time the teacher had used Cooperative Learning and digital technologies in her lessons, and it is reported widely (see for example, Casey and Goodyear 2015; Dyson and Casey, 2012) that it takes time for teacher to learn how to teach and support learning using a new pedagogical approach. Similar to the work of Casey et al. (2017), therefore, the three dimensions of pedagogy – teachers/teaching, learners/learning and context – should to be acknowledged as key components in the application of digital technologies. This study provides empirical evidence that all three interrelated dimensions of pedagogy acted as resisting factors, which made the integration of technology for the first time challenging and complex.

Pupils' resistance to technology and pupils' struggles with using technology to learn is a relatively new finding. Through the use of the terms digital natives or the iGeneration, it is often assumed that because technology is a prominent aspect of young people's lives, pupils will be willing and able to use it in pedagogical contexts to learn (Prensky 2012; Rosen 2010). It was clear from this study that pupils need time to learn how to use technology in order to learn. For example, when pupils were initially given the iPads they took selfies, as this might be an activity for which they normally use technology (Selwyn and Stirling 2016).

Pupils also did not associate the iPads with learning in physical education, and saw technology as being part of another school subject (i.e. ICT). Furthermore, some of the students did not display high levels of digital competence, as seen through the challenges of navigating and using the functions of the iPads (e.g., passwords), features (e.g., camera) and specific applications (e.g., Dartfish). Results from this study, therefore, challenge assumptions that young people will be able to transfer their uses of technology from a social environment to a pedagogical environment (Prensky 2012; Rosen 2010). The uses of technology in the units were perhaps different to their social uses of technology outside of school (see for example, Selwyn and Stirling 2016) and despite a lesson zero it took several lessons for students to develop a level of competence to use the iPad to support their peers' learning. Generational assumptions about digital competence are therefore not helpful when we consider how learners will use and engage with digital technologies in pedagogical contexts. This study shows that young people need time to learn how to use the technology, that extends beyond a lesson zero, and then time to learn how to learn using the technology within physical education.

Although the identified barriers to technology and pedagogy initially presented challenges to the learning environment, it was how these barriers were identified and responded to which ultimately aided the learning process for the teacher and the pupils. Through teacher reflections and focus group interviews the teacher-researcher was able to identify pupils' unfamiliarity with a new pedagogical context and adapt her practice accordingly to address her pupils' learning needs. As suggested by Armour and MacDonald (2011), the reflexive element of action research allowed for reciprocal collaboration between the teacher-researcher and pupils to co-construct new knowledge about how the iPads could be used to support learning. Recognising unfamiliarity and learning from it should, therefore, be accepted as part of the evolving learning process to implementing technology in physical

education. Consequently, we suggest that action research, or equally any forms of practitioner research that involve intentional and systematic reflection, serve as key facilitators for teachers to develop appropriate change knowledge for using digital technologies that are specific to their practice and pupils.

This study has also shown that selecting a well-defined pedagogical approach that has been previously reported to support technology use, such as Cooperative Learning (Johnson and Johnson 2014), will not automatically result in positive learning experiences for pupils. When the pedagogical approach and the digital technology are both new to the pedagogical context, both teachers and pupils need time to become familiar with the new teaching and learning context. Yet over time, and in agreement with Prensky (2012), the practices of peer teaching and cooperation inherent within Cooperative Learning are an "enormous free resource dramatically aided by technology" (Prensky 2012, 25). In this study, technology acted as a resource to support pupils' engagement with group work and academic and social learning tasks. The uses of digital technologies to support learning, therefore, warrants further exploration by teachers and researchers. Barriers to using digital technologies will inevitably exist, however, action research can be used as a key driver to support teachers learning how to incorporate digital technologies into their classrooms.

Although this study demonstrated positive impact, there were several limitations. Firstly, the study design was focussed on 8 lesson units. Given that it takes several units for students and teachers to become skilled at learning within a new pedagogical model (Dyson and Casey 2012; Fernandez-Rio *et al.* 2016), the novelty of Cooperative Learning and the iPads may have impacted on teaching and learning. In agreement with Casey and Goodyear (2015) future investigations should look to go "beyond the initial point of implementation". Secondly, although mechanisms were embedded to support an authentic implementation of Cooperative Learning, to ensure that robust accounts are provided of models-based practice

further validation approaches, similar to Casey et al. (2015), could have been considered. Finally, novelty is an issue. Although barriers and facilitators to Cooperative Learning are well documented (see Dyson and Casey 2016, 2012), to provide a rigorous account of the influence of technology in physical education future investigations should avoid introducing two novel approaches simultaneosuly.

A teacher-researcher final reflection

Practitioners need to dare to embrace the ever changing landscape of physical education in the 21st century, in order to relate to the technologically-driven environment in which children are immersed and keep pace with societal developments. It is only by recognising that change will bring challenges and through incorporating the opinion of pupils, as the learners, we can truly strive to understand how technology can be used effectively within physical education. It is plausible to suggest that we will never fully understand the true extent of technological benefits, due to the ever-advancing technological gadgets, yet taking the first step to gain an initial understanding will go a long way to initiating the ever-learning process.

I suggest future research needs to be conducted across a variety of sports and year groups to gain a complete picture of the situational context in which iPads and Cooperative Learning can be used successfully in physical education. Secondly, research needs to be conducted in an environment with no iPad restrictions to add depth to the research field by allowing technology to be utilised to a greater capacity. Lastly, I suggest the need to extend the lesson zero to incorporate an introductory unit. This would allow time for the teacher and pupils to overcome unfamiliarity with technology and pedagogy. Research on subsequent units would enable practitioners and researchers to fully appreciate and explore the true extent to which pedagogy and technology can impact on pupil learning.

References

Armour, K., and D. MacDonald, 2011. *Research Methods in Physical Education and Youth Sport.* Oxon, UK: Routledge.

Armour, K., Evans, G., Bridge, M., Griffiths, M., and Lucas, S., 2016. "Gareth: The beauty of the iPad for revolutionising learning in physical education." In A. Casey, V. Goodyear, and K. Armour. *Digital Technologies and Learning in Physical Education: Pedagogical Cases*. London: Routledge, p.213-230.

Ax, J., P. Ponte, and N. Brouwer. 2008. "Action Research in Initial Teacher Education: An Explorative Study." *Educational Action Research* 16 (1): 55–72.

Burke, S. 2016. "Rethinking 'validity' and 'trustworthiness' in qualitative inquiry." In B. Smith and A. Sparkes. *Routledge Handbook of Qualitative Research in Sport and Exercise*. London: Routledge, p.330-339.

Casey, A., 2013. "Seeing the trees not just the wood": Steps and not just journeys in teacher action research. *Educational Action Research*, 21(2): 146-162.

Casey, A. 2010. "Practitioner Research in Physical Education: Teacher Transformation Through Pedagogical and Curricular Change." Unpublished PhD thesis, Leeds Metropolitan University.

Casey, A., Goodyear, V.A., and Armour, K.M. 2017. "Rethinking the relationship between pedagogy, technology and learning in health and physical education." *Sport, Education and Society,* 22(2): 228-304.

Casey, A., Dyson, B., and Campbell, A., 2009. Action Research in Physical Education: focusing beyond myself through cooperative learning. *Educational Action Research,* 17 (3): 407-423.

Casey, A., and Goodyear, V., 2015. "Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A review of Literature." *Quest*, 67 (1): 56-72.

Casey, A., Goodyear, V., and Dyson, B. (2015). Model fidelity and students' responses to an authenticated unit of Cooperative Learning. *Journal of Teaching in Physical Education, 34:* 642-660.

Casey, A. and Jones, B., 2011. "Using digital technology to enhance student engagement in physical education." *Asia-Pacific Journal of Health, Sport & Physical Education,* 2 (2): 51-66.

Dwyer, S. C., and Buckle, J. L. 2009. The space between: On being an insider–outsider in qualitative research. International. *Journal of Qualitative Methods*, 8(1): 54–63.

Chambers, F., Sherry, J., Murphy, O., O'Brein, W., and Breslin, G., 2016. "James: Physical education teacher". In A. Casey, V Goodyear, and K. Armour. *Digital Technologies and Learning in Physical Education: Pedagogical Cases*. London: Routledge, p.49-68.

Dartfish. 2015. *About Dartfish.* [online] [viewed 30/09/15] Available at: http://www.dartfish.com/About

Dyson, B., and Casey, A., 2016. *Cooperative Learning in Physical Education and Physical Activity: A Practical Introduction*. London: Routledge.

Dyson, B., and Casey, A., 2012. *Cooperative learning in physical education: A research-based approach*. London, England: Routledge.

Dyson, B., Linehan, N., and Hastie, P., 2010. "The ecology of Cooperative Learning in Elementary Physical Education Classes." *Journal of Teaching in Physical Education*, 29: 113-130.

Dyson, B., 1994. "*A case study of two alternative elementary physical education programs*." Unpublished doctoral dissertation., Ohio State University.

Enright, E., Robinson, J., Hogan, A., Stylianou, M., Hay, J., Smith, F., and Ball, A., 2016. "Jarrod: The promise and messy realities of digital technology in physical education."

In A. Casey, V. Goodyear, and K. Armour. *Digital Technologies and Learning in Physical Education: Pedagogical Cases*. London: Routledge. p.173-190.
Fairbairn, G., and Fairbairn, S., 2004. *Writing Your Abstract: A Guide for Wold-be-conference Presenters*. California: APS Publishing.
Fernandez-Balboa, J., 2003. "Physical Education in the digital (postmodern) era." In A. Laker, .*The future of physical education: Building a new pedagogy*. London: Routledge, p. 37-152.
Fernandez-Rio, J., Sanz, N., Fernandez-Cando, J., and Santos, L., 2016. Impact of a sustained Cooperative Learning intervention on student motivation. *Physical Education and Sport Pedagogy*, 20, p 1-17.
Fullan, M. (2015) The New Meaning of Educational Change. 5th edn. New York: Teachers College Press.
Fullan, M., 2013. *Stratosphere: Integrating Technology, Pedagogy and Change Knowledge.* Toronto: Pearson Canada.
Fullan, M., 2011. *Choosing the Wrong Drivers for Whole System Reform*. Melbourne, AU: Centre for Strategic Education.
Fullan, M., and Donnelly, K.. 2013. *Alive in the swamp: assessing digital innovations in education.* London: Nesta.
Gardner, H., and David, K. 2014. *The App Generation*. London: Yale University Press.
Goodyear, V.A. 2016. "Sustained profesionl development on Cooperative Learning: Impact on six teachers' practices and students' learning". *Research Quarterley for Exercise and Sport*, iFirst Article doi:10.1080/02701367.2016.1263381
Goodyear, V.A., Casey, A., and Kirk, D. 2014. "Hiding behind the camera: social learning within the Cooperative Learning model to engage girls in physical education". *Sport, Education & Society*, 19(6): 712-734.
Hastie, P., Casey, A., and Tarter, A., 2010. "A case study of wikis and student-designed games in physical education." *Technology, Pedagogy and Education*, 19 (10): 79-91.
Hu, H., and Garimella, U., 2014. "iPads for STEM Teachers: A Case Study on Perceived Usefulness, Perceived Proficiency, Intention to Adopt, and Integration in K-12 Instruction." J*ournal of Educational Technology Development and Exchange*, 7 (1): 49 – 66.
International Society for Technology in Education. (2008). The ISTE Standards for Teachers [online] [viewed 12/02/16]. Available at: http://www.iste.org/standards/iste-standards/standards-for-teachers
Johnson, D., and Johnson, R., 2014. "Using technology to revolutionize cooperative learning: an opinion." *Frontiers in Psychology*, 5: 1-3.
Juniu, S., 2011. "Pedagogical Uses of Technology in Physical Education." *JOPERD*, 82 (9): 41 – 48.
Kemmis, S., and McTaggart, R., 1998. *The action research planner*. Geelong, Victoria, Australia: Deakin University Press.
Kretschmann, R., 2015. "Physical education teachers' subjective theories about integrating information and communication technology (ICT) into physical education. *Turkish Online Journal of Educational Technology*, 14 (1): 68-96.
Law, N., Pelgrum, W., and Plomp, T., 2008. *Pedagogy and ICT use in schools around the world. Findings from the IEA SITES 2006 study*. Hong Kong: Comparative Education Research Centre, Springer.
Lei, J., 2010. "Quantity versus quality: A new approach to examine the relationship between technology use and student outcomes." *British Journal of Educational Technology*, 41: 455-472.
Lincoln, Y., and Guba, E. 1985. *Naturalistic Inquiry*. Beverly Hills, CA: SAGE.

McCaughtry, N., Oliver, K., Dillon, S., and Martin, J., 2008. "Teachers'' perspective on the use of pedometers as instructional technology in Physical education: A cautionary tale." *Journal of Teaching in Physical Education, 27:* 83-99.

Öhman, M., Almqvist, J., Meckbach, J., and Quennerstedt, M., 2014. "Competing for ideal bodies: a study of exergames used as teaching aids in schools". *Critical Public Health*, 24 (2): 196-209.

O'Loughlin, J., Chroinin, D., and O'Grady, D., 2013. "Digital video: The impact on children's learning experiences in primary physical education." *European Physical Education Review*, 19 (2):165-182.

Orlando, J., 2014. "Veteran teachers and technology: Change fatigue and knowledge insecurity influence practice." *Teachers and Teaching: Theory and Practice*, 20: 427-439.

Palao, J., Hastie, P., Cruz, P., and Ortega, E., 2015. "The impact of video technology on student performance in physical education." *Technology, Pedagogy & Education*, 24 (1): 51 – 63.

Penney, D., Jones, A., Newhouse, P., and Cambell, A., 2012. Developing a digital assessment in senior secondary physical education. *Physical Education and Sport Pedagogy*, 17(4): 383-410.

Potrac, P., Jones, R., and Cushion, C., 2007. "Understanding power and the coach's role in professional English soccer: A preliminary investigation of coach behaviour." *Soccer and Society*, 8 (1): 33-49.

Prensky, M., 2012. *From Digital Natives to Digital Wisdom*. Thousand Oaks, CA: Corwin.

Pyle, B., and Esslinger, K., 2014. "Utilizing Technology in Physical Education: Addressing the Obstacles of Integration." *Education Technology*, 35-42.

Rosen, L., 2010. *Rewired: Understanding the iGeneration and the Way They Learn*. New York: Palgrave Macmillan.

Selwyn, N., 2014. *Distrusting educational technology: critical questions for changing times*. London: Routledge.

Selwyn, N., and Stirling, E., 2016. "Social media and education…now the dust has settled." *Learning, Media & Technology*, 41(1): 1-5.

Smith, B., and Caddick, N. 2012. Qualitative methods in sport: A concise overview for guiding social scientific sport research. *Asia Pacific Journal of Sport and Social Science*, 1: 60-73.

Smith, B., Tomason, J., Latimer-Cheung., and Martin Ginis, K. 2015. Narrative as a knowledge translation tool for facilitating impact: Translating physical activity knowledge to disabled people and health professionals. *Health Pscyhology*, 34: 303-313.

The Apple Corporation. 2015 *iPad in Education*. [online] [viewed 07/03/16] Available at: https://www.apple.com/education/ipad/apps-books-and-more/

UK Office of Communications (2014) *The Communications Market 2014* [online]. Available at: http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr14/UK_1.pdf